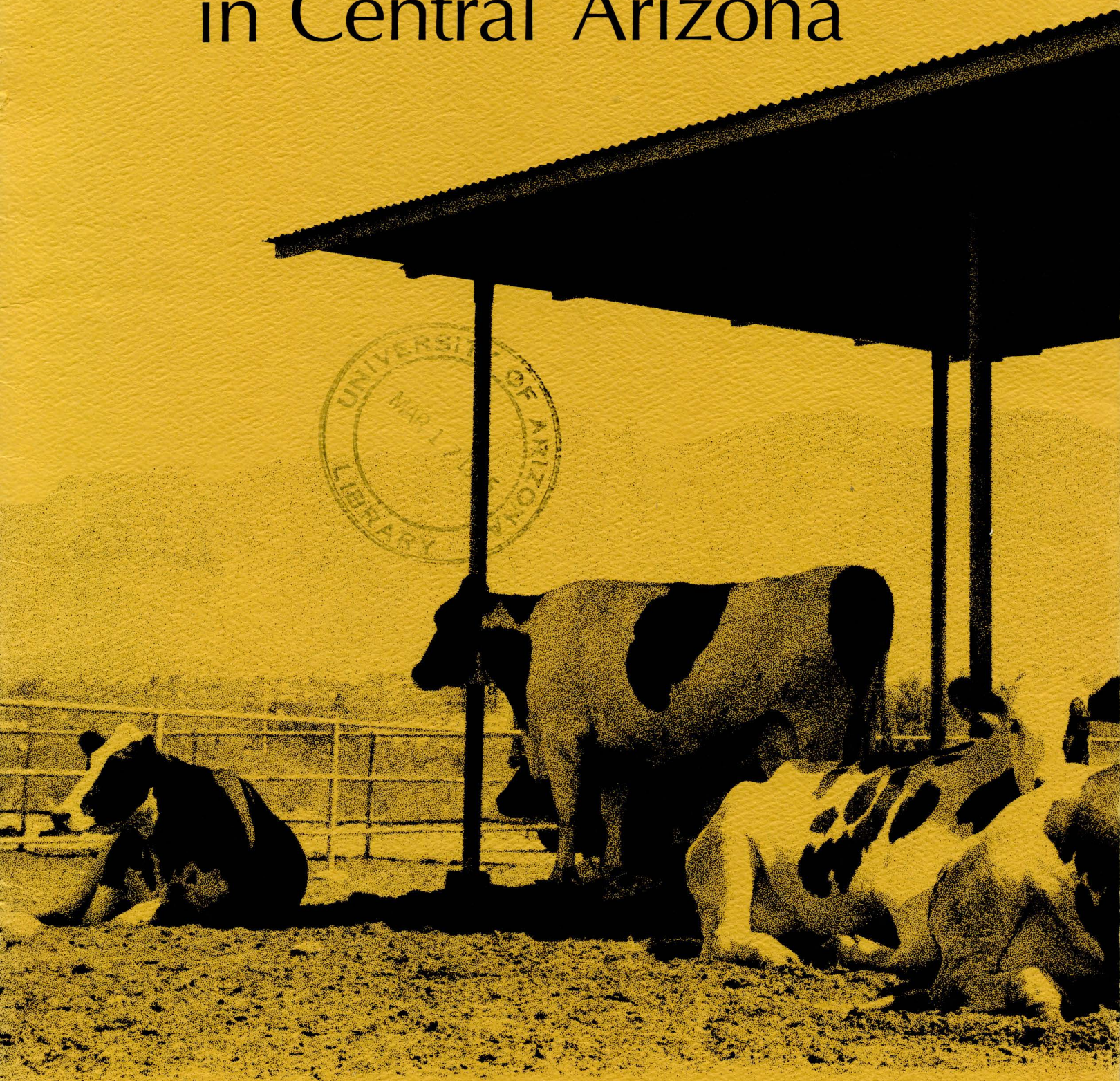
Dairying Costs in Central Arizona



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Dairying Costs in Central Arizona

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Dairying Costs in Central Arizona

N. Gene Wright and Robert C. Angus*

Dairy budgets typical of Arizona operations were developed to be used as guides for management decisions. At present Arizona dairy farms average approximately 350 cows, ranging from 72 to 1,500. Thus, Arizona provides a somewhat unique opportunity to observe large scale milking parlors with dry lot facilities.

Budgets contained in this publication were developed using a synthetic approach. Data were collected from a sample of dairies in specific size groups as well as from Extension and research personnel. Construction costs were arrived at from information provided by companies who specialize in dairy construction. The prices used in these budgets were current as of fall 1973.

SIZE

The basic dairy is budgeted for 350 Holstein cows, which can be expanded to 700 cows using the same basic milking facilities and equipment plus additional corrals. These size groups were selected because 350 cows represented an average operation and the 700 cow unit represented a large unit in the judgment of the authors. The average size of operation is increasing in Arizona to meet the milk requirements of a rapidly expanding population. Cows are milked an average of 305 days per year and produce 15,250 pounds of milk each. A typical cow is kept in the herd for three years. Consequently, 117 replacement heifers are needed each year for the 350-cow herd and 234 heifers for the 700-cow herd. This level of replacement is high enough to cover cull cows and death losses. Replacement heifers are all purchased from outside sources and are priced at $650 each, delivered to the dairy. These heifers are usually purchased sixty to ninety days before they calve.

CAPITAL INVESTMENT

The major capital investment items in any dairy budget are: land, milk base, corrals, milking facilities, waste systems, water systems, and feeding equipment.

Land

The general rule at this time is to allow 10 cows per acre of land to satisfy Environmental Protection Agency (EPA) regulations. Therefore, the minimum acreage of land for the basic 350-cow dairy is 35 acres but this does not allow for any expansion or changes in allowances in the number of cows per acre. Rough estimates indicate that a decrease of 20 cows from the 350-cow herd would lower returns so that payments to management would not be covered at the $12,000 level. Smaller units continue to operate in Arizona because the managers replace hired labor. In this budget, 80 acres of land was included to allow expansion of the basic dairy to 700 cows and have enough land for waste disposal, feed storage, and other purposes.

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Shipping Rights or Milk Base

Milk base is used in operating a market-sharing program by the United Dairymen of Arizona, a bargaining and supply cooperative. The base is owned by individual members but transfer of ownership must be made through the cooperative. A few non-coop dairymen operate under a "shipping right" agreement with one processor.

Milk base applies to the pounds of milk delivered per day to a processing plant. In order to start a new dairy in Central Arizona or expand an existing dairy, milk base or shipping rights must be purchased. During 1973, milk base in Central Arizona has fluctuated between 10 and 25 dollars per pound. For purposes of these budgets, milk base is allocated at 50 pounds of base per cow at a price of $12 per pound, or $600 per cow. If a specific Central Arizona dairy cannot meet the milk base assigned to it, the dairy may have to pay the price differential for imported milk. During the past two years, milk base in Central Arizona has been expanding about 10 percent per year to encourage production to meet the expanding demand.

Corrals and Auxiliary Facilities

Corrals are constructed of pipe, steel cable, and cement. Included in the corral costs are the corrals, fences, feeding area, alleyways, gates, loading chute, evaporative cooled shades, grain storage, water facilities, lights, and hospital facilities. Current costs of these corrals are about $190 per cow. Of this, approximately $50 per cow is the cost of the evaporative cooling system. Evaporative cooled shades in Central Arizona have increased summer and fall milk production six to ten percent and reproductive efficiency even more. Corral costs are $66,500 for the 350-cow dairy and $133,000 when 700 cows are milked.

Milking Facilities

An automated Double-8 Herringbone milking parlor with capacity to milk 75 cows per hour under good management is budgeted for both the 350 and 700-cow dairy. One milker could milk two four-hour shifts in the 350-cow dairy. However, seven hundred cows is approaching the limit of an automated Double-8 Herringbone parlor during an eight-hour milking shift, so a second milker would be needed to milk the second eight-hour shift. The size of the dairy could be doubled without constructing new parlor facilities.

Budgeted cost of the automated Double-8 Herringbone milking parlor is $100,000, which includes in addition to base equipment and building construction, automatic detaching units, power gates, and stimulating sprays. Base equipment would include stalls, feeders, feed distribution and storage, pipeline milking system, milk tank, ventilation, plumbing, hot water, electrical components, miscellaneous equipment, restrooms, and office.

Waste Management System

More and more pressure is being exerted upon the Arizona Dairy Industry to have a workable waste management system. In these budgets, $15,000 was allocated for a system. This system

would collect solids and liquid waste from the holding pens and milking systems. Solids would be separated from the liquid by a solid waste separation device and the liquid pumped into a pond. Water from this pond could be used to irrigate field crops. The EPA is becoming more strict in regard to waste disposal and adequate land should be available to dispose of all liquid waste from the dairy. The basic system is adequate for both the 350 and 700-cow dairy at this time, but a second pond may have to be constructed for the 700-cow dairy under increasing EPA regulations.

Water Sytem

A 350-cow dairy will need 50,000 to 60,000 gallons of water daily. In areas where city water is not available, two wells of at least 50 gpm capacity with a storage tank which will hold a 24-hour supply of water should be budgeted. In these budgets, a well of this capacity is allocated at a cost of $8,000. A storage tank and distribution system is budgeted at a cost of $5,000 for the 350-cow dairy. An additional $3,000 is budgeted for increased storage capacity for the 700-cow dairy.

Mobile Equipment

Additional equipment would include a stock trailer and a ¾-ton pickup to pull the trailer and a self-unloading feed truck with scales. Two hay wagons and two tractors are budgeted for hay feeding. One of the tractors would be equipped with a front loader and blade to clean corrals and load trucks. Both size dairies would have $37,700 invested in equipment, although the 700-cow dairy would use the equipment more hours per day.

VARIABLE EXPENSES

Feed

The largest single expense in the dairy business is the cost of feed fed to the cows. Milking cows were budgeted an average of 35 pounds of alfalfa hay per day. Purchased replacement heifers were budgeted 32 pounds of hay per day for 75 days prior to calving. Consequently, milking cows were fed 6.39 tons of alfalfa per year, replacement heifers 1.2 tons. Alfalfa hay was priced at $50 per ton in Central Arizona. Total cost of hay for a year was $118,700 for the 350-cow dairy and $237,450 for the 700-cow dairy.

Milking cows were fed an average 16 pounds of concentrate per day during lactation which averaged 305 days. Concentrates were priced at $110 per ton and each milking cow consumed 2.44 tons. Purchased replacement heifers were not fed concentrates prior to calving. Total yearly cost of concentrates was $93,940 for the 350-cow dairy, double for the 700-cow dairy.

Labor

Labor required for a 350-cow dairy includes the owner-operator plus three men. The owner-operator acts as the swing or relief man plus the supervisor. Hired labor costs $27,600, plus $4,140 for fringe benefits. Fringe benefits amount to about 15 percent of the total wages. The owner-operator is assigned $12,000 per year.

The 700-cow dairy requires five men at a cost of $45,600 per year, plus $6,840 in fringe benefits. A full-time manager-supervisor is paid $15,000 per year. Total yearly labor costs were $43,700 for the 350-cow dairy and $67,440 when 700 cows are milked.

Repairs

Repair and maintenance were calculated as 4.0 percent of the original cost for the milking facilities and 2.5 percent of the original cost for corrals and other equipment. Vehicle expenses were calculated at $1.90 per hour of use for the pickup, $3.20 per hour for the feed truck, and $1.35 per hour for the tractors. Depreciation on all equipment and machinery was calculated as shown in the depreciation table.

Operation

Other expenses such as utilities, supplies, taxes, insurance and miscellaneous cash expenses were calculated on a per cow basis. Veterinary expenses were budgeted at $15 per cow, AI charges were $10.35 per cow.

Production testing costs $.55 per cow, per month, or $6.60 per cow per year. Most milk produced in Central Arizona is marked by the UDA which charges $.07 per cwt. for dues and averages $.09 cwt. for capital retains. During 1973, hauling costs were $.19 per cwt. for milk delivered to UDA. An additional charge of $.06 per cwt. of milk is checked-off for promotional and advertising expenses administered by Arizona Milk, Inc. Usually a portion of the UDA dues and/or capital retains are rebated at the end of the year as a return to the coop members.

Electricity

Many locations for new dairies would require construction of feeder facilities from the main power line to the dairy. This cost can amount to several thousand dollars in rural areas. In these budgets $4,000 is allowed for this cost for both dairy sizes.

Interest

Two interest charges are calculated in these budgets. Interest on variable costs are charged at eight percent for six months. Also, eight percent interest is charged on the investment in capital items.

Dairy operators prefer to buy the spring cuttings of alfalfa hay. Consequently, most operators of a 350-cow dairy would need to borrow in excess of $100,000 in order to purchase a year's supply of alfalfa hay during a 90-day period in the spring of the year. The 700-cow dairy would need $237,000. for the purchase of a year's supply of alfalfa hay.

Interest charges of eight percent on an investment of $717,990 amounted to $57,439 for the 350-cow dairy. When the dairy was expanded to 700 cows, interest charges were $94,299 on a $1.2 million investment. However, the rate of interest is arbitrary and may vary for individual dairies.

GROSS RECEIPTS

Sources of income are: milk, cull cows, day-old calves, and rebate from UDA if the milk producer is a member and a dividend is declared.

Cows are milked for 305 days per year and average 50 pounds per day. Each cow produces 15,250 pounds of milk per year. Producer milk prices have fluctuated considerably during 1973, a price of $7.83/cwt. delivered to the UDA plant in Phoenix is used.

Cow death loss is calculated as four percent of the milking herd. Since one-third of the milking herd is replaced each year, 101 cull cows are sold by the 350-cow dairy and 202 by the 700-cow dairy. Each cull cow was estimated to weigh 1,200 pounds and bring $.35 per pound or $420.

All calves are sold as day-old and sustain a six percent death loss at birth. For purposes of these budgets all sold calves will be equally divided between bulls and heifers. Heifer calves were sold for $120 each, bulls for $60 each. The 350-cow dairy will sell $31,160 worth of calves a year versus $62,320 for the 700-cow dairy.

In 1972, members of the UDA were paid a rebate or dividend of $.08 per cwt. of milk delivered to UDA.

When calculating any budget, a certain base must be used in regard to income and expense figures. In these budgets, September 1973 prices were used for expenses and all income but the rebate from UDA which is the 1972 figure.

TABLE 1

Investment, Expense and Return Comparisons between 350 and 700-Cow Dairy Herds

	Cows	
	350	**700**
	(dollars)	
INVESTMENT		
Capital investment	788,000	1,277,500
Machinery and equipment	37,700	37,700
EXPENSES		
Labor	31,740	52,440
Feed	212,640	425,330
Operation and maintenance	61,166	112,108
Replacement heifers	76,050	152,100
Insurance and taxes	3,000	4,800
Depreciation	26,432	30,932
Management	12,000	15,000
Interest on:		
Variable costs	12,222	23,595
Capital investment	57,465	94,351
Total expenses	492,715	910,656
Total income	494,136	988,272
Cost/cwt. of milk—53,375 cwt.	9.23	
Cost/cwt. of milk—106,750 cwt.		8.53

TABLE 2

Arizona Dairy budget Summary—350-Cows

	(dollars)
RECEIPTS	
Milk	
15,250 pounds per cow x 350 cows = 5,337,500 pounds	
5,337,500 pounds @ $7.83/cwt.	417,926
Cull cows (4% death loss)	
101 cull cows @ $420 each	
1,200 pounds @ $.35	42,420
Calves (6% death loss)	
164 bull calves @ $60 each	9,840
164 heifer calves @ $120 each	19,680
Rebate from Coop $.08/cwt. of milk	
53,375 cwt. milk x $.08/cwt.	4,270
Total	**494,136**
EXPENSES	
Feed costs	
Hay—2,374 tons @ $50/ton	118,700
Concentrates—854 tons @ $110/ton	93,940
Total	**212,640**
Labor	
Three hired men	27,600
Fringe benefits ($27,000 x 15%)	4,140
Total	**31,740**
Operation and Maintenance	
Coop and check-off	11,742
Repairs	6,804
Utilities	6,600
Supplies	7,000
Vehicle expenses	5,595
Miscellaneous cash	2,100
Testing	2,310
Hauling (milk)	10,143
Vet and AI	8,872
Total	**61,166**
Replacement heifers-	
117 @ $650	76,050
Interest on ½ variable cost @ 8%	
$308,546 @ 8% x .5	12,222
Insurance and taxes	3,000
Depreciation	26,432
Management Supervision	12,000
Interest on investment in capital items	
$718,315 @ 8%	57,465
Grand Total of Costs	**492,715**

TABLE 3

Arizona Dairy budget Summary—700-Cows

	(dollars)
RECEIPTS	
Milk	
15,250 pounds per cow x 700 cows = 10,675,000	
10,675,000 pounds @ $7.83/cwt.	835,852
Cull cows (4% death loss)—202 cull cows @ 420 each	
1,200 pounds @ $.35	84,840
Calves (6% death loss)	
328 bull calves @ $60 each	19,680
328 heifer calves @ $120 each	39,360
Rebate from Coop $.08/cwt. of milk	
106,750 cwt. milk x $.08/cwt.	8,540
Total	**988,272**
EXPENSES	
Feed costs	
Hay—4,749 tons @ $50/ton	237,450
Concentrates—1,708 tons @ $110/ton	187,880
Total	**425,330**
Labor	
Five hired men	45,600
Fringe benefits ($45,600 x 15%)	6,840
Total	**52,440**
Operation and Maintenance	
Coop and check-off	23,485
Repairs	8,542
Utilities	12,000
Supplies	14,000
Vehicle expense	7,230
Miscellaneous cash	4,200
Testing	4,620
Hauling (milk)	20,286
Vet and AI	17,745
Total	**112,108**
Replacement heifers	
234 @ $650	152,100
Interest on ½ variable costs @ 8%	
$589,878 x 8% x .5	23,595
Insurance and taxes	4,800
Depreciation	30,932
Management-Supervision	15,000
Interest on investment in capital items of	
$1,179,390 @ 8%	94,351
Grand Total of Costs	**910,656**

APPENDIX

TABLE I

350-Cow Dairy

(dollars)

EXPENSES

Feed	
Milking cows (350)	
Roughage—365 days x 35 pounds/day = 12,775/2,000= 6.39 tons	
6.39 tons x 350 cows = 2,236 tons x $50/ton	111,800
Concentrate—305 days x 16 pounds/day = 4,880/2,000 = 2.44 tons	
2.44 tons x 350 cows = 854 x $110/ton	93,940
Replacements (115)	
Roughage—75 days x 32 pounds/day = 2,400/2,000 = 1.2 tons	
1.2 tons x 115 replacements = 138 tons x $50/ton	6,900
Labor	
Two men @ $800/month =2 x $9,600	19,200
One man @ $700/month = 1 x $8,400	8,400
Total	**27,600**
Fringe Benefits & vacations @ 15% of total labor bill 15% x $27,600	4,140
Repairs	
Corrals 2.5% of original cost/year $66,500	1,662
Milking 4% of original cost/year $100,000	4,000
Other equipment 2.5% of original cost/year $45,700	1,142
Vet and breeding (AI) Vet $15/cow/year x 350	5,250
AI $4.50 x 2.3 services x 350	3,622
Vehicle expenses	
Pickup—$1.90/hour x 700 hours/year	1,330
Feed truck $3.20/hour x 700 hours/year	2,240
Tractors $1.35/hour x 1,500 hours/year	2,025
Replacement heifers—115 @ $650	74,750
Utilities—$550/month	6,600
Supplies—$20/cow/year x 350	7,000
Taxes and insurance—$250/month	3,000
Miscellaneous cash expenses—$6/cow/year x 350	2,100
Production testing @ $.55/cow/month	2,310
Milk Hauling—15,250 pounds @ $.19/cwt x 350 cows $28.98 x 350	10,143
Coop dues and fees, plus check-off ($.16 dues + .06 check-off) 15,250 pounds @ $.22/cwt. x 350 cows $33.55 x 350	11,742
Interest on investment in capital items	
Depreciable items	
Original cost $245,700	
+ Salvage value 20,280	
$265,980 x .5	132,990
Livestock	
Value of 350 cows @ $600 = $210,000	
Value of 39 heifers @ $650 = $ 25,350	
Salvage value of 465 animals @ $420 = $195,300	
$430,650 x .5 =	215,325
Land	
80 acres @ $2,000	160,000
Milk base	
350 cows @ $600	210,000
Total	**($718,315 x 8%= 57,465)**

CAPITAL INVESTMENT

Item	
Corrals—shade—evaporative cooling water facilities—cement aprons—holding pens—hospital facilities—feed storage, etc. (complete) @ $190/head of capacity x 350 milking cows	66,500
Milking facilities	
Milking parlor—milk cooling tank—building—office automated Double 8 Herringbone (complete)	100,000
Waste management system—solid waste separation device—pond—pumping station stand pipe, etc.	15,000
Well (2)—50 gallon per minute—50,000 gallon storage tank—pressure system—complete facilities @ $8,000/well, plus $5,000 for pressure system and tank	21,000
Electricity to dairy from main power line	4,000
Fence (Perimeter) 1½ mile @ $1,000/mile	1,500
Land—80 acres @ $2,000/acre	160,000
Cows—350 @ $600/head	210,000
Milk base—50 pounds of daily milk base/cow @ $12/pound $600 x 350 cows =	210,000

MACHINERY AND EQUIPMENT

Item	
Hay wagon 2 @ $1,000 each	2,000
¾ Ton pickup	4,000
Stock trailer—20 ft. gooseneck	2,200
Feed truck—self unloading	18,000
Tractor—front loader and blade	6,500
Tractor—(30-40 hp)	5,000

DEPRECIATION SCHEDULE

Item	New Cost	Salvage Value	Difference	Years of Life	Charge per Year
Corrals	$ 66,500	$ 2,000	$64,500	15	$ 4,300
Milking facilities	100,000	10,000	90,000	7	12,857
Wells	21,000	2,000	19,000	15	1,267
Electricity to dairy	4,000	200	3,800	15	253
Fence	1,500	30	1,470	15	98
Waste management	15,000	1,000	14,000	7	2,000
Hay wagons (2)	2,000	50	1,950	15	130
¾ T pickup	4,000	1,000	3,000	3	1,000
Stock trailer	2,200	100	2,100	10	210
Feed truck	18,000	3,000	15,000	5	3,000
Tractor and loader	6,500	500	6,000	7	857
Tractor	5,000	400	4,600	10	460
	$245,700	**$20,280**			**$26,432**

TABLE II

700-Cow Dairy

(dollars)

EXPENSES

Feed	
Milking cows (700)	
Roughage—365 days x 35 pounds/day = 12,775/2,000 = 6.39 tons	
6.39 tons x 700 cows = 4,473 tons x $50/ton	223,650
Concentrate—305 days x 16 pounds/day = 4,880/2,000 = 2.44 tons	
2.44 tons x 700 cows = 1,708 tons x $110/ton	187,880
Replacements (230)	
Roughage—75 days x 32 pounds/day = 2,300/2,000 = 1.2 tons	
1.2 tons x 230 replacements = 276 tons x $50/ton	13,800
Labor	
Three men @ $800/month = 3 × $9,600	28,800
Two men @ $700/month = 2 × $8,400	16,800
Total	**45,600**
Fringe Benefits and vacations @ 15% of total labor bill 15% x $45,600	6,840
Repairs	
Corrals 2.5% of original cost/year $133,000	3,325
Milking 4% of original cost/year $100,000	4,000
Other equipment 2.5% of original cost/year $48,700	1,217
Vet and breeding (AI) Vet $15 per cow/year x 700	10,500
AI $4.50 x 2.3 services x 700	7,245
Vehicle expenses	
Pickup—$1.90/hour x 700 hours/year	1,330
Feed truck $3.20/hour x 1,000 hours/year	3,200
Tractors $1.35/hour x 2,000 hours/year	2,700
Replacement heifers 230 @ $650	149,500
Utilities $1,000/month	12,000
Supplies $20 per cow/year x 700	14,000
Taxes and insurance—$400/month	4,800
Miscellaneous cash expenses—$6 per cow/year x 700	4,200
Production testing @ $.55 per cow/month $6.60 x 700	4,620
Milk hauling 15,250 pounds @ $.19 cwt. x 700 cows $28.98 x 700	20,286
Coop dues and fees, plus check-off ($.16 dues + .06 check-off) 15,250 pounds @ $.22/cwt. x 700 cows $33.55 x 700	23,485
Interest on investment in capital items	
Depreciable items	
Original cost $315,200	
+ Salvage value 22,280	
$337,480 x .5	168,740
Livestock	
Value of 700 cows @ $600 = $420,000	
Value of 78 heifers @ $650 = 50,700	
Salvage value of 930 animals @ $420 = 390,600	
$861,300 x .5 =	430,650
Land	
80 acres @ $2,000	160,000
Milk base	
700 cows @ $600 each	420,000
Total	**1,179,390**
(1,179,390 x 8% =	94,351)

CAPITAL INVESTMENT

Item	
Corrals—shade—evaporative cooling water facilities—cement aprons—holding pens—hospital facilities—feed storage, etc. (complete) @ $190/head of capacity × 700 milking cows	133,000
Milking facilities	
Milking parlor—milk cooling tank—building—office automated Double 8 Herringbone (complete)	100,000
Waste management system—solid waste separation device pond—pumping system stand pipe, etc.	15,000
Well (2)—50 gallon/minute—80,000 gallon—storage tank—pressure system—complete facilities @ $8,000/well, plus $8,000 for pressure system and tank	24,000
Electricity to dairy from main power line	4,000
Fence (Perimeter) 1½ mile @ $1,000/mile	1,500
Land—80 acres @ $2,000/acre	160,000
Cows—700 @ $600/head	420,000
Milk base—50 pounds of daily milk base per cow @ $12/pound $600 x 700 cows	420,000

MACHINERY AND EQUIPMENT

Item	
Hay wagon—2 @ $1,000 each	2,000
¾T pickup	4,000
Stock trailer—20 ft. gooseneck	2,200
Feed truck—self unloading	18,000
Tractor—front loader and blade	6,500
Tractor—(30-40 hp)	5,000

DEPRECIATION SCHEDULE

Item	New Cost	Salvage Value	Difference	Years of Life	Charge per Year
Corrals	$133,000	$ 4,000	$129,000	15	$ 8,600
Milking facilities	100,000	10,000	90,000	7	12,857
Wells	24,000	2,000	22,000	15	1,467
Electricity to dairy	4,000	200	3,800	15	253
Fence	1,500	30	1,470	15	98
Waste management	15,000	1,000	14,000	7	2,000
Hay wagons (2)	2,000	50	1,950	15	130
¾T pickup	4,000	1,000	3,000	3	1,000
Stock trailer	2,200	100	2,100	10	210
Feed truck	18,000	3,000	15,000	5	3,000
Tractor & loader	6,500	500	6,000	7	857
Tractor	5,000	400	4,600	10	460
	$315,200	**$22,280**			**$30,932**